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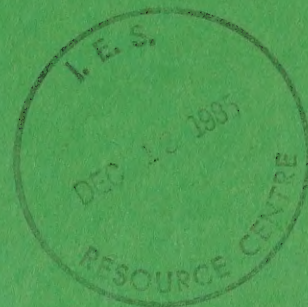
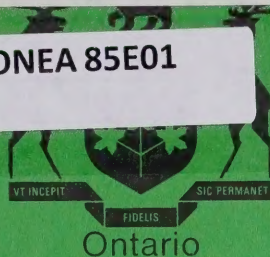
Ontario. Environmental Assessment Board.

EP-85-01

AN APPLICATION BY 3M CANADA INC. FOR A CERTIFICATE OF
APPROVAL FOR AN ENERGY FROM WASTE RECOVERY PLANT...

1985.

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ENVIRONMENTAL ASSESSMENT BOARD

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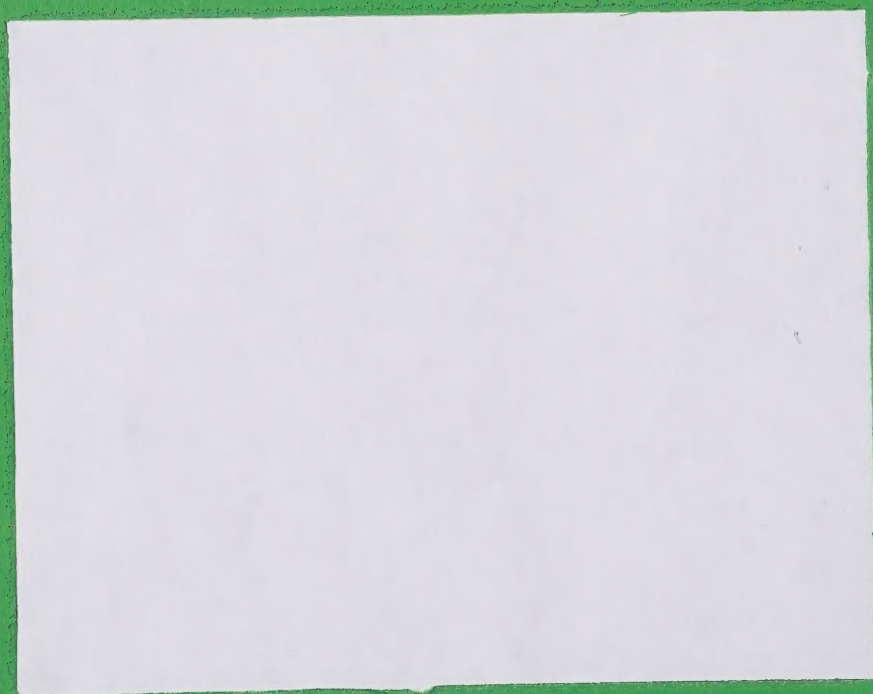
EP-85-01

An application by 3M Canada Inc. for a
Certificate of Approval for an Energy
from Waste Recovery Plant (incinerator)
to be located on property owned by 3M
Canada Inc. on Oxford Street East,
(south half of Lot 5, Concession II)
City of London

BEFORE: B.E. Smith, Chairman
J.E. Simpson, Member

Report of the Board dated December 5, 1985

Environmental Assessment Board
1 St. Clair Ave. W. 5th Floor
Toronto, Ontario M4V 1K7



**EP-85-01**

An application by 3M Canada Inc. for a Certificate of Approval for an Energy from Waste Recovery Plant (incinerator) to be located on property owned by 3M Canada Inc. on Oxford Street East, (south half of Lot 5, Concession II) City of London

BEFORE: B.E. Smith, Chairman
J.E. Simpson, Member

Report of the Board dated December 5, 1985



IN THE MATTER OF Section 30(1) of the
Environmental Protection Act (R.S.O.
1980, c.141) as amended,

- and -

IN THE MATTER OF an application by 3M
Canada Inc. for a Certificate of Approval
for an Energy from Waste Recovery Plant
(incinerator) to be located on property
owned by 3M Canada Inc. on Oxford Street
East, (south half of Lot 5,
Concession II) City of London

APPEARANCES:

George F. Plaxton Q.C. and
G.T. Tillman

- for 3M Canada Inc.

John Martin

- for Regional Director
(Southwestern Region) for
the Ministry of the
Environment

Stephen Garrod

- for Dawn Erskine et al
representing Pottersburg
Creek Pollution Committee

William Albert Donnelly

- for Township of West
Nissouri

REPORT

The recommendation contained herein has been greatly
facilitated by the co-operation developed among the parties
to this application and we wish to add that their efforts
have been extremely helpful and are appreciated.

This application by 3M Canada Inc. is for approval of the issuing of a certificate to permit construction of an energy from waste incinerator at the company's existing plant in the City of London. Selected waste material from outside sources is to be burned along with waste products from the corporation's manufacturing process to produce steam for use in the plant. The proposed incinerator process achieves an ancillary benefit in that some process gases which are being discharged into the atmosphere will be diverted through the incinerator and destroyed. Occasionally, these gases have caused odour problems to nearby residents and this process change should eliminate that type of nuisance.

On Wednesday, August 7, 1985 the public hearing commenced in the Council Chambers of the City of London. An adjournment was requested at the outset by Mr. Plaxton, counsel for 3M, who stated that test results on a two-stage incinerator in Prince Edward Island were to be released at the end of August by Environment Canada. The P.E.I. facility was stated to be similar to the proposed 3M waste to energy facility, and Mr. Plaxton indicated that the P.E.I. emission results in particular would provide important information and would be valuable to the Board in assessing 3M's project.

The motion for adjournment was supported by Ms. Erskine, Chairperson for the Pottersburg Creek Pollution Committee. She needed time to arrange for expert assistance. An

adjournment was granted and the hearing continued on Tuesday, October 15, 1985.

In support of the application, evidence was called in technical areas to describe the process and equipment, the air emissions and their controls, and the analysis of test results from a two-stage combustion waste incinerator at a plant in Prince Edward Island.

The technical report, Proposed Energy From Waste Facility-3M Canada Inc., filed as Exhibit 13, describes the equipment and facilities proposed and the operational details for the waste incinerator. Except for some corrections and some modifications made in light of additional information becoming available, the conclusions and recommendations reached in this study are relied upon by the applicant as support for the approval being sought.

Mr. A.G. Mills, Vice-President Technology Services for 3M Canada Inc. provided the Board with background information concerning the 3M operation.

He stated that when the project was announced a public meeting was held by 3M at Fanshawe College at London in July 1985, and two information meetings were arranged with the Pottersburg Creek Pollution Committee to explain the P.E.I. facility, the process detail, and its comparison to the proposed 3M facility. Company officials outlined the

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benefits of the 3M project and these are summarized as follows:

- 1/16 less material to be sent to local landfill site;
- the amount of energy needed for 1500 London homes would be saved;
- added export sales potential;
- the elimination of odour.

Mr. Mills also stated that 3M's Environmental Conservation Policy has been recognized internationally, and that 3M has provided brochures regarding the proposed facility to employees and residences in the surrounding area.

The project was conceived in March 1981 and subsequently surveys of waste and equipment were undertaken.

The proposed facility is to be a 15,000 square foot building addition to the present powerhouse. It consists of two rooms, the receiving room and the room that has the combustion and energy from waste facilities. Two large doors will serve as an entrance and exit for waste haulers and a smaller entrance will be used for the receipt of 3M generated waste. There is a concrete receiving area where waste material is dumped and sorted, and a fuel storage area. A front-end loader takes bulky materials to the shredder, then the waste material is moved by conveyor to the storage area. From the storage area the waste proceeds to the feeder consisting of a hopper and a ram which feeds materials into the incinerator. The fuel is partially combusted in the

primary rotary kiln chamber. Ash from this process passes through a chute to a quench tank and a drag conveyor. Dewatering takes place before the ash is deposited in a container for disposal at a landfill site.

The combusted gases flow from the primary chamber to the secondary chamber and from there through a duct, past the emergency by-pass stack, through a tempering zone to the boiler which produces steam to be used in the 3M plant. From the boiler, the combusted gases travel through the economizer, lime powder injector and through the baghouse. An induced draft fan which is an exhaust fan to the stack, exhausts the gases through the stack to the atmosphere.

Mr. W. Peter Torbet, Manager, Facilities Engineering, 3M Canada Inc. and William D. Goodings, Professional Engineer, Vice-President & Manager, Southern Ontario Branches, Proctor & Redfern, testified with respect to the waste materials to be used at the proposed facility.

The fuel for the incinerator would be a combination of one-third 3M plant generated wastes and two-thirds waste material received from outside haulers. The composition and volume of the plant generated waste are known quantities and are totally under 3M's control. The externally received materials, however, would vary in composition. The outside waste that is received will be supplied by two waste haulers in the London area. These two companies have agreed

contractually to deliver selected materials to the 3M facility on a preferential basis.

3M's fuel requirement and plant capacity is such that they require less than half of the wastes collected by the waste haulers. 3M has made an assessment of the most desirable sources for the facility based on inspection of the wastes generated and the type of operation. The intention is to optimize the infeed waste based on heat value, ease of handling and type of waste.

Materials to be used are listed as:

- commercial and industrial waste;
- non-toxic and non-hazardous materials;
- clean, solid, industrial scrap;
- paper, cardboard, old pallets, scrap tape, adhesives.

3M's waste consists of:

- 14% non-process waste, i.e. wood, packing supplies, cardboard, cafeteria waste, floor sweepings;
- 45% tape waste, i.e. tape backings, coating, packaging supplies;
- 30% abrasive and Scotchbrite waste, i.e. backings, coatings, packaging supplies;
- 11% adhesive wastes, i.e. rubber resin, inert clays and talcs, phenol resins, zinc oxide, pigments and dyes, acrylic polymers.

The haulers would be bringing waste from areas now serviced by a landfill site designated W-12A, meaning it can only accept domestic, commercial, non-hazardous, solid industrial

and other (limited to sludgecake, wood debris and building material) waste, and ash from Victoria Hospital.

The receiving operation is expected to operate from 7:00 a.m. until 8:00 p.m. on a 5-day week basis. Saturday operation would be considered based on the waste hauler's operations and the suitability of the material available. The daily receipts will average 70 tons per day to sustain the 7-day, 24-hour incinerator operation. This would result in approximately 12 loads of 6 tons each being received at the plant.

Each load would be inspected visually to ensure that it does not contain undesirable material, i.e. large metal objects or liquid material.

The receiving, fuel processing and fuel storage areas have been laid out to provide maximum flexibility of infeed to the system. A high percentage of the loads received would contain only wood and paper. These loads would be directed to the fuel storage area for off-shift and weekend operation. Loads containing food waste would be directed into the feed hopper to avoid their retention in the storage area. Supervisory and operating personnel would be responsible for receiving, inspection and control.

Mr. Joseph Kennedy, President of Enercan Energy Services Inc. and Vice-President of Enercan Inc., and

Mr. James Dempster, Manager of Modular Technology Projects, Enercan Inc., provided detailed information regarding the proposed energy from waste facility equipment, control monitoring, operations, maintenance and training. (Exhibit 13, II, p.1-3, III and Appendices A & B).

Solid Waste Receiving

Solid waste fuel, received from outside sources, would be trucked inside the enclosed receiving and storage building. Plant waste would be brought into the facility from the manufacturing plant by a forklift tractor.

Waste Processing and Storage

Due to the expected wide fluctuations in the size of the solid waste material to be received at the facility, a heavy duty slow-speed rotary shear-type shredder is provided to reduce bulky solids to a uniform size. This enables a better mixing of various wastes and produces maximum heat value from them. The plant operator directs and observes the unloading of waste on the tipping floor within the building. Using a front-end loader, he feeds bulky materials to the shredder, piles "as-received" and shredded waste in the storage areas (within the building) and transfers waste periodically to the hopper supplying the incinerator feed conveyor. During each of these steps, the operator has the opportunity to examine closely the waste composition, removing unsuitable items for

disposal according to M.O.E. directions. The use of a tipping floor permits recycling of recoverable materials when economic factors justify it.

Furnace Feed System

Solid waste fuel is fed to the primary combustion chamber of the Enerkiln system at a controlled rate by a hydraulic ram. The hopper above the feed ram receives the waste fuel as required by means of a fuel feed conveyor. The conveyor can store approximately 4.5 tonnes of solid waste fuel.

Staged Combustion

The Enerkiln Staged Combustion System is designed so that the initial combustion stages take place under substoichiometric (below proper chemical proportions) conditions in a rotary kiln. The partially combusted gases released from the solid waste fuel pass into a secondary chamber where the combustion process is completed. The solid waste fuel is rotated slowly in the kiln and this circular movement combined with the slope of the kiln produces an effective gentle tumbling action thereby transporting the burning waste toward the discharge end. As fresh waste enters the kiln it is dried by the hot gases and then passes into the next zone where the volatile organic components are driven off. The carbon remaining in the hot residue is oxidized by a controlled amount of combustion air injected at the ash discharge end of

the kiln. The resulting hot flue gas, depleted of oxygen, flows at low velocity, through the volatilizing and drying zones of the kiln before moving into the secondary combustion chamber. The temperature of the gases leaving the rotary kiln are 650-750°C and this temperature range is regulated by the air supply. The primary chamber is equipped with a burner for start-up operation and a water spray for emergency temperature control.

Secondary Combustion Chamber

The secondary combustion chamber is located higher than the primary chamber and is cylindrical in shape. As partially combusted gases coming from the primary chamber enter the secondary chamber, and come into contact with a controlled amount of excess air injected through tangential ports, vigorous mixing occurs. The additional air is a combination of oven exhaust from the 3M plant (approximately 15%) and ambient air. Thorough oxidation of the volatile organic component of the oven exhaust and of the primary chamber gases is ensured by the effective mixing process and by baffles which prevent short circuiting of the gas flow. A retention time of at least one second at a temperature above 982°C (1800°F) must be achieved. An auxiliary burner is provided for initial warm-up and for supplementary heat if required to maintain this temperature. Thermocouples are located at the discharge end to ensure gas temperatures do not fall below 982°C (1800°F).

Flue Gas Duct

A refractory lined duct is provided between the secondary chamber and the heat recovery boiler. A tempering zone is provided before the boiler to cool the gases by mixing with recirculated flue gas.

Temporary Heat Release (Emergency By-Pass Stack)

A hot gas emergency relief valve and a vent to reduce temperature is provided in the flue gas duct before the boiler. This valve will open in the event of power failure, induced draft fan failure, excessive flue gas temperature, system overpressure or low water level in the boiler feed drum. The stack is designed to be sixty feet above the ground and it is estimated that it would be used less than ten times a year.

Heat Recovery Boiler

A 15,000 kg/hour (33,000 lb/hr) heat recovery boiler equipped with an economizer is provided to generate 1720 kPa (250 psig) saturated steam. This system is designed to accept the products of combustion from the secondary combustion chamber and reduce their temperature to 230°C (450°F). Retractable and stationary soot blowers are provided to periodically clean the boiler tubes. The boiler is equipped with a drum

level control system and a heating coil to preheat the feedwater supplied by the existing boiler feedwater pumps.

Gas Cleaning System

Between the economizer and the baghouse (a large industrial version of a vacuum cleaner), the combusted gases flow through a duct where dry lime is injected. The dry lime injection system is to provide an alkaline material which will neutralize the acidic content of the gas stream. Secondly, the dry lime provides a pre-coating of the filter material in the baghouse so that particulate removal is more effective. Turbulence in the duct is created by a conical reducer and expander. This mixes the lime dust thoroughly with the gases. Submicron particles agglomerate forming larger particles which are more effectively removed at the baghouse.

The gases enter the baghouse and must leave by going through one of the eight hundred bags located in four chambers. The lime and dust collect on the outside of the bags with only a small amount passing through the filter medium. At the bottom of the baghouse is a conical hopper where the dust and ash accumulates.

Induced Draft Fan and Stack

An induced draft (I.D.) fan is provided to draw the combustion gases from the secondary combustion chamber through the boiler and the gas cleaning system. A damper at the inlet to the fan controls the draft in the primary furnace chamber. The filtered gas is vented to the atmosphere by the I.D. fan through a stack of 27.5 metres in height (more than twice the building height). The stack is required to be double the height of the roof to comply with Regulation 308 of the Environmental Protection Act which permits the use of the C and D type atmospheric conditions and dispersion formula. The stack is designed to have a diameter of 1.1 metres. The temperature of the gases entering the stack is approximately 205°C.

Ash Handling

The hot ash from the facility is quenched in an Enercan wet ash handling system. The quench tank provides an effective air seal for the ash discharge port. The ash is dewatered by an inclined conveyor and loaded into a container for transport to a landfill site.

Plant Heating and Ventilation

Air heated by the external surface of the combustion chambers, boiler and duct work will be distributed to other

parts of the plant for cold weather heating. Air will be exhausted from the receiving and storage area into the combustion area to provide combustion air for incineration. Air makeup to the building will be provided by wall louvres, and heated air which is surplus to temperature control and combustion requirements, will be vented through the roof of the powerhouse.

Process Control System

Mr. Dempster described the process control system.

A Programmable Controller with digital and analog capabilities will control the whole process. The system provides optimum flexibility and reliability. Control of process variables will be fully automated with closed-loop control systems which maintain process set-points. Interlocking of the system ensures safety of personnel and equipment.

The feed of solid waste to the kiln is controlled by adjusting the speed of the feed ram stroke. The air to the primary chamber is controlled by means of an inlet damper on the primary chamber fan. This damper modulates the air flow to maintain a constant temperature in the primary chamber. The natural gas burner in the primary chamber is used for initial start-up only.

The secondary chamber control parameter is its temperature. Under normal conditions, the secondary chamber temperature is maintained by varying the volume of excess air introduced through the secondary chamber fan modulating damper. During start-up, or in the event of low temperature in the secondary chamber, the natural gas burner automatically ignites and maintains the necessary temperature.

The induced draft fan damper modulates to maintain a constant negative pressure in the primary chamber, thereby maintaining a relatively constant pressure profile through the system.

Under emergency conditions, resulting from equipment or power failure, the temporary heat release stack damper automatically opens to vent the high temperature flue gas to the atmosphere, and the combustion system is shut down.

Opacity Meter

The opacity meter, which measures a beam of light passing across the stack, is not included in the control loop and supplies independent readings. An alarm alerts the operator if the obstruction of light (an indication of particulate matter) exceeds twenty percent. This level meets the requirement of Regulation 308.

Carbon Monoxide Analyser

The carbon monoxide (CO) analyser measures the flue gas. The preferred location for this piece of equipment is after the boiler so that the gas temperature will be cooler and a better analysis can be made. The CO analyzer is important from an operational point of view in that it records the effectiveness of the facility, because CO is one of the most difficult organics to burn. Nevertheless, Mr. Dempster does not consider this measuring device to be an essential operating instrument.

A record of the measurement information provided by these controls is maintained for seven years and used to pinpoint discrepancies and trends. Mr. Kennedy stressed that the objective of this incinerator is to operate a steam generation facility on a continuous basis, consistent with safe operating and good maintenance practices. There are planned plant shutdowns for July and December each year, which coincide with the manufacturing shutdowns. At this time maintenance tasks will be performed.

Operating Staff

The proposed facility will be operated and maintained by qualified operating engineers trained for this type of process.

Staff additions will be made prior to start-up to ensure adequate time for formal classroom instruction and familiarization with the equipment. Visits by operators of the new facility to a similar type operation in Cuba, New York and other existing facilities are planned.

Emissions

Enercan's two-staged combustion system, which forms the basis for the proposed alternate fuel energy recovery facility, is designed for minimal air emissions. The high temperature secondary combustion chamber and the gas cleaning equipment added to the system ensure a level of air emissions well below the requirements of Regulation 308. Liquid effluents discharged to the sanitary sewage system are minimal and would comply with By-law No. W-982-188 of the City of London. Solid residue in the form of ash from combustion is to be transported in suitable containers to the W-12A landfill site.

Dr. Sydney C. Barton, Manager, Air Quality and Organic Analysis, Environmental and Chemical Engineering Division of the Ontario Research Foundation, and Dr. Colin J. Baynes, Environmental Consultant, CJB Association Inc. assessed the impact on air quality of the proposed 3M facility. Their report on this investigation (Exhibit 13, Appendix H) -

- identifies the potential emissions;
- establishes the expected emission rates;

- derives from these emission rates the maximum expected ground level concentrations using procedures prescribed in Regulation 308 of the Ontario Environmental Protection Act;
- identifies the benefits of eliminating exhaust from a process oven and flue gases from existing boilers;
- concludes that "projected emissions of contaminants from the proposed 3M Canada facility will not contravene current Ontario Environmental Protection Act regulations and guidelines or have a significant impact on ambient air quality.

The projected maximum ground level concentrations from the report are tabled page 24, Exhibit 13. Comparisons are also made with maximum levels permitted under Regulation 308 or current guidelines for the commonly accepted significant emissions from an energy from waste system. In all cases, the projected maximum concentration is well below the maximum permitted. For example, the calculated maximum impingement concentration of PCB's is less than 1% of the amount permitted by Regulation 308 and the calculated amount of dioxin is about 5% of the permitted concentration.

Dr. Barton also advised that a ten-storey apartment building with an estimated overall height of 33 metres and located 1067 metres from the energy from waste site was identified as the critical receptor. All of the calculated impingement concentrations for this receptor have been calculated and are subsequently less than the levels stipulated by Regulation 308, and only three of the estimated concentrations exceed 10% of the permitted concentration, (zinc at 29.9%, hydrogen chloride at 21.0% and particulate matter at 18.8%).

Test results for the dry lime injection/baghouse system, as amended in Exhibit 29, confirm that the particulate removal efficiency of the system would be better than the assumed value. The resulting emission rate (0.82 grams/sec.) can, therefore, be used with confidence in deriving maximum impingement concentrations for comparison with permitted levels.

National Incinerator Testing and Evaluation Program (NITEP)

A witness panel comprising A. Finkelstein and R.K. Klicius, employees of Environment Canada, gave evidence on the test results at the Prince Edward Island facility.

A comparison of the NITEP-PEI facility results and 3M facility estimates are shown in Table 20, Appendix H, of Exhibit 13 and in Table 20A of Exhibit 29. They confirm that realistic estimates were used in the derivation of emission factors. Estimated metal concentrations are generally higher using the NITEP data than previously estimated, but are still well below permitted concentrations.

Additional comparisons of dustfall and total fluoride with Regulation 296 are well below the critical values and are shown in Table 17A of Exhibit 29.

Federal Grant

Part of the cost of this project is being underwritten by a fire grant of about one million dollars from the Federal Government. This grant is only available if the incinerator is put into operation before March of 1987. Accordingly, the Board was urged that approval, if it is to be granted, must be given without delay in order to meet this time schedule.

Pottersburg Creek Pollution Committee

Dawn Erskine, an officer of Pottersburg Creek Pollution Committee (an unincorporated organization) is a party to these proceedings. Counsel on her behalf, stated that the Pottersburg Creek Pollution Committee does not take a position in opposition to the proposed facility but is participating at the hearing to ensure that all reasonable steps are taken to provide suitable stack emission controls, complete monitoring and recording of the operation with public notice, and good maintenance and operational procedures. This mandate was fulfilled by cross examination of the witnesses, presenting concluding arguments, and working with the other parties toward the development of suitable terms and conditions.

Regional Director, Ministry of the Environment

The Regional Director, Southwestern Region, Ministry of the Environment is also a party, and evidence on the Director's

behalf was given by a witness panel consisting of James Janse, Wilfred Ng and Gordon Complin. This panel explained the regulatory forms of emission control which is broken down into four categories:

- 1) **Standards** - enforceable as law, in this case Regulation 308.
- 2) **Tentative Standards** - do not have the force of law but are controls identified by the Ministry, following careful review, and ones where sufficient confidence exists to have them added to Regulation 308 at the first opportunity.
- 3) **Guidelines** - provide a list of contaminants where current information available is not necessarily complete, but there is sufficient information to warrant some form of criteria being set.
- 4) **Provisional Guidelines** - in this category less information is available than for a guideline, but there is sufficient information to justify listing the contaminant. As more information becomes available it is anticipated that the contaminant would be moved up into the Guideline category.

The witness panel described four criteria examined in setting guidelines and tentative standards: effects on humans, both with respect to health and nuisance, effects on animals, effects on vegetation and effects on damage to property. When sufficient data is produced on all four criteria, the contaminant may be shifted into the Tentative Standard category.

The Ministry officials gave consideration to standards, tentative standards and guidelines, in reviewing the application by 3M Canada Inc. As a result, the Ministry concluded that the proposed application will not result in emissions exceeding safe levels. In fact, the Ministry anticipates that the incinerator can be operated to produce stack emissions well below the various regulatory levels. The Ministry, therefore, is not objecting to the approval of the application, provided that certain terms and conditions are attached to the certificate of approval.

Terms and Conditions

Counsel for 3M Canada Inc. presented a document setting out terms and conditions (Exhibit 10) which he suggests would provide appropriate controls on the design and operation of the facilities to safeguard the natural environment and the health and safety of the inhabitants of the community. These terms and conditions are to a substantial degree similar to the conditions attached to the approval for the Victoria Hospital incineration project in the City of London. Subsequently, and with a minor difference of opinion on temperature standards, all parties agreed to a set of terms and conditions which should be attached to any approving certificate. These terms and conditions were filed as Exhibit 37.

The contentious item relates to the wording of TEMPERATURE DESIGN CRITERIA, clause 3 and, as drafted by the applicant, it states as follows:

3. "The incinerator shall be designed to be capable of:
 - a) maintaining, on a continuous basis, a temperature of at least 2000° Fahrenheit (1093° Celsius) in the secondary chamber; and
 - b) providing for a retention time of at least one (1) second at a minimum temperature of 1800° Fahrenheit (982° Celsius) and an excess air rate of at least 100%.

The applicant and the Ministry agree that the dispute is not founded on any technical ground but relates to procedures for metric conversion and rounding off figures. The Ministry contends that a certificate and its conditions should be worded in the metric system and not Imperial units of measurement. The temperature value in clause 3 of 2000° Fahrenheit converts to 1093° Celsius and the Ministry suggests that this figure of 1093° should be rounded off to 1100° Celsius and inserted in clause 3(a).

Similarly, 982° Celsius in Clause 3(b) should be rounded off to 1000° Celsius and this value carried into clause 4 of the conditions.

In support of its position, the Ministry argues that this adjustment would not place any significant financial hardship on the applicant and the rounded off figure will likely be used as the value for future temperature standards for two-stage incinerators.

The applicant argues that increasing the temperature standard by the rounding-off operation would cause additional expense to the company and since there is no scientific basis for the change, the Board should not endorse it.

We accept the position of the Ministry on this issue for the reasons it gave. The applicant was not able to show a significant financial burden by the temperature adjustment and we prefer to follow at this time what is the best judgment of a future government standard.

Township of West Nissouri

The Township of West Nissouri is listed as a participant and not a party in these proceedings. William Albert Donnelly, Deputy Reeve of the Township, expressed general concerns about the effects of a waste incinerator operation on the agricultural industry with particular reference to the effect of gas emissions on grass, plants, livestock and the corrosive effects on farm equipment and machinery.

The evidence showed that a separation of nearly 2200 metres exists between the nearest boundary of the Township of West Nissouri and the proposed incinerator. All technical evidence pointed out that a separation of this distance is more than sufficient to protect the natural environment from any harmful effects of stack emissions.

Board's Expert Assistance

Pursuant to section 18(9) of the Environmental Assessment Act, Dr. Eugene Koczkur was appointed to assist the Board by providing special knowledge with respect to potential air pollution problems associated with the project.

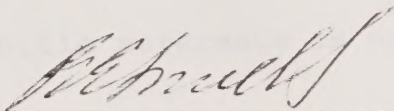
Dr. Koczkur studied the technical reports, attended the hearing and heard the evidence presented. He gave his opinion that the proposed incinerator facility can be designed and operated with a minimal effect on the surroundings. He participated in the drafting of the terms and conditions which were eventually agreed upon by the parties and he endorses their adoption as a condition of approval.

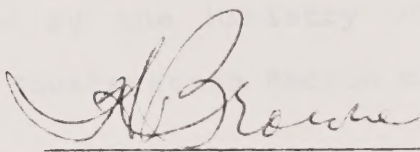
CONCLUSIONS

We have concluded that the proposed two-stage waste incinerator can be operated in a safe and efficient manner, capable of meeting the Ministry's emission standards and guidelines without danger of environmental impairment. We have also reviewed the proposed terms and conditions agreed to by the parties (as modified by us) and we find them to be appropriate and a necessary condition of approval.

RECOMMENDATION

The Board, therefore, recommends that the application be approved subject to the submission of satisfactorily detailed design plans and specifications to the Director of Environmental Approvals and Project Engineering Branch, Ministry of the Environment, and subject also to the terms and conditions set forth in Schedule "A" attached hereto.


B.E. Smith
Chairman


H. Browne, P.Eng.
Board Secretary

TERMS AND CONDITIONS

RE: 3M CANADA INC.

1. Definitions

- a) "3M" means 3M Canada Inc.;
- b) "EFW facility" means the proposed Energy From Waste facility to be situated on land owned by 3M on the north side of Oxford Street, south half of Lot 5, Concession II, in the City of London, and comprising one refuse incinerator;
- c) "Ministry" means the Ministry of the Environment, Province of Ontario, unless specific reference is made to another Ministry;
- d) "Regional Director" means the employee of the Ministry for the time being appointed by the Ministry of the Environment as the Director, Southwestern Region of the Ministry;

Design and Operating Criteria - Total System

- 2. 3M shall cause a refuse incinerator and flue gas equipment comprising a dry lime injection and baghouse system to be installed with the following manufacturers' design criteria applicable thereto capable under design conditions of:
 - a) reducing hydrogen chloride emissions by at least 75%;
 - b) reducing hydrogen fluoride emissions by at least 75%;
 - c) reducing sulphur dioxide emissions by at least 30%;

- d) limiting emissions of organic matter having a carbon content, expressed as equivalent methane (referred to as total hydrocarbon) to a concentration of no greater than 50 ppm; and
- e) limiting total suspended particulate emissions in the stack gas to not greater than 0.034 grams per actual cubic meter (0.015 grains per actual cubic foot (ACF)).

The facility shall be maintained and operated so that under design conditions the same shall meet the design criteria in (a), (b), (c) and (d) above, and in the case of (e) above, emissions shall not be greater than 0.046 grams per actual cubic meter (0.020 grains per actual cubic foot).

Temperature Design Criteria

- 3. The incinerator shall be designed to be capable of:
 - a) maintaining, on a continuous basis, a temperature of at least 1100^o Celsius (2012^o Fahrenheit) in the secondary chamber; and
 - b) providing for a retention time of at least one (1) second at a minimum temperature of 1000^o Celsius (1832^o Fahrenheit) and an excess air rate of at least 100%.

Other Operating Criteria and Shutdown Procedures

- 4. The temperature at the outlet of the secondary chamber of the incinerator shall be regulated during the start-up, incineration and shut down phases of operation of the incinerator by means of an auxiliary fuel control set point so as to ensure that a minimum of 1000^o Celsius (1832^o Fahrenheit) shall be attained prior to the introduction of

waste into the primary chamber and thereafter shall be maintained during the incineration and subsequent shut down phases:

- a) until final ash discharge, in the case of a scheduled shutdown; or
- b) until restoration of power, or for a period of at least one hour, whichever is the shorter period, in the case of a non-scheduled shutdown arising in consequence of electric power failure during which any emergency by-pass stack or other system by-passing the baghouse is utilized; or
- c) for a period of at least fifteen minutes from the commencement of such shutdown phase or longer if necessary to ensure that combustion in the primary chamber has ceased, in the case of any other non-scheduled shutdown not arising in consequence of an electric power failure during which any emergency by-pass stack or other system by-passing the baghouse is utilized.

Upon the occurrence of a non-scheduled shutdown of any kind, the introduction of further waste and air into the rotary chamber of the incinerator and the rotation of such chamber shall automatically cease. The employees of 3M operating the EFW facility shall be directed, upon the occurrence of a non-scheduled shutdown, to close immediately all outside doors in such facility and the main outside door in the adjoining boiler house.

Equivalent Stack Criteria

5. The EFW facility shall be constructed with a main stack that under design conditions will provide substantially the same dispersion effect, (calculated in accordance with the formula in paragraph 2 (c) of the Appendix contained in Ontario Regulation 308, R.R.O. 1980), as a stack having the following criteria:

- a) a stack height of 27.5 metres;
- b) a stack diameter of 1.10 metres;
- c) a stack gas velocity of 15.0 metres per second;
- d) a stack exit gas temperature of 205° Celsius
(400° Fahrenheit).

Opacity Meter

6. There shall be continuous monitoring of incinerator stack emissions by means of an opacity meter equipped with a continuous recording device for subsequent reference and analysis with alarm control set points for positive indications of abnormal conditions.

Continuous Process Controls

7. There shall be continuous process control and supervisory equipment as follows:
- a) one carbon monoxide analyser;
 - b) one oxygen analyser with high-low controls;
 - c) temperature sensors at the outlets of the primary and secondary chambers, at the inlet to the baghouse and in the main stack;

- d) a pressure sensor at the outlet of the secondary chamber and at the inlet and outlet of the baghouse (to measure the pressure drop);

The process equipment specified in (a) and (b) above and the secondary chambers outlet temperature sensor will be equipped with continuous recording devices for subsequent reference and analysis, and all of the aforesaid process control equipment will be equipped with appropriate alarm set points for positive indication of abnormal conditions. 3M shall not use any emergency by-pass stack or other system by-passing the baghouse as an operating device or during normal shutdown procedures but shall limit the use thereof to emergency situations.

Replacement Bags For Baghouse

8. Replacement bags for the baghouse system shall be at least equal in quality to those originally specified and installed.

Asbestos Waste

9. 3M shall not accept asbestos waste for incineration.

Additional Point of Impingement Limitations

10. 3M shall comply with the limitations on Point of Impingement concentrations of the contaminants listed below. These contaminants shall be deemed to be included in Column 1, Schedule 1 of Ontario Regulation 308, R. R. O. 1980 with the related maximum concentrations at a point of impingement

included in Column 3 of the aforesaid Schedule 1. Source emission limitations are to be applied as described in Section 5, Ontario Regulation 308.

<u>Column 1</u>	<u>Column 2</u>	<u>Column 3</u>
Name of Contaminant	Unit of Concentration	Concentration at Point of Impingement Half Hour Average
Dibenzodioxins*	Picograms per cubic metre of air	450
Arsenic**	Total micrograms of arsenic in free and combined form per cubic metre of air	15
Barium	Total micrograms of water soluble barium per cubic metre of air	30
Selenium	Total micrograms of selenium in free and combined form per cubic metre of air	20
Silicon	Total micrograms of silicon as silica less than 10 microns in diameter per cubic metre of air	15
Pentachlorophenol	Micrograms of pentachlorophenol per cubic metre of air	60
Polychlorinated Biphenyls	Nanograms of Polychlorinated biphenyls per cubic metre of air	450
1,2,4-Trichlorobenzene	Micrograms of 1,2,4-Trichlorobenzene per cubic metre of air	100

* Concentrations of Dibenzodioxins and Dibenzofurans mixtures shall be limited at the point of impingement in accordance with the following formula, for a one-half hour maximum concentration:

$$\frac{X}{450} + \frac{Y}{450 \times 50} = 1$$

where X = concentration of dibenzodioxins in picograms per cubic metre

Y = concentration of dibenzofurans in picograms per cubic metre;

** The value for arsenic in column 3 above replaces that found in Ontario Regulation 308 for the purposes of this approval.

Stack Sampling

11. Isokinetic stack sampling shall be conducted in accordance with the Source Testing Code of the Ministry on the stack during normal operation as follows:

- once within four months of full normal operation of the EFW facility, (and such other further testing as the Regional Director may reasonably require), for the following parameters:

a) hydrogen chloride, and fluorides;

b) suspended particulate matter and fractions in the suspended particulate matter for the following heavy metals:

Antimony	Copper	Phosphorous
Arsenic	Iron	Selenium
Barium	Lead	Silicon
Beryllium	Lithium	Silver
Boron	Magnesium	Tin
Cadmium	Manganese	Titanium
Calcium	Mercury	Vanadium
Chromium	Nickel	Zinc

c) chlorinated dibenzodioxins, chlorinated dibenzofurans, polychlorinated biphenyls, 1, 2, 4-Trichlorobenzene, pentachlorophenols and total hydrocarbons.

Complaint Procedures

12. 3M shall provide a procedure for receiving and responding to complaints as follows:

- a) a specific telephone number and personnel shall be designated to receive complaints concerning the operation of the EFW facility during all hours of operation;
- b) complaints will be received either by telephone or letter at the EFW facility;
- c) each complaint shall be recorded on a formal complaint form setting out the nature and description of the complaint; the name, address and telephone number of the complainant; the date and time of the complaint and provision for the signature of the complainant; sufficient space for a formal reply to the complaint and a response report, both of which shall be completed by facility personnel; and shall be entered in a sequentially numbered log book;
- d) each complaint shall be referred to the manager of the EFW facility as soon as practicable after the complaint is received and notification made to the Regional Director (or his designate) as soon as practicable;
- e) upon receipt of the complaint, whether or not signed by the complainant, the manager shall, where the circumstances require, issue the appropriate instructions to correct the cause; report on the

complaint and response using the complaint form outlined in (c) above; forward a copy of the completed complaint form to the complainant; and recommend appropriate management or operating changes to reasonably avoid the recurrence of similar causes; and

f) the pattern and nature of complaints received, responses made and recommendations for operational changes needed to prevent the recurrence of persistent causes of complaint shall be included in the annual performance review referred to in Condition No.14 below.

Records and Monthly Reports

13. Throughout the operational life of the EFW facility 3M shall:

- a) retain at such facility the original entry records for all recording devices referred to in conditions 6, 7 and 9 above;
- b) maintain and retain daily records of the estimated waste component make-up, sources of waste and estimated quantities by weight of the incoming waste and the quantities and description of all outgoing wastes;
- c) prepare within twenty (20) days following the end of each calendar month, a report summarizing the results of such recording devices and daily waste records for the calendar month just ended and commenting upon the significance thereof;

all upon the basis that such original entry records and monthly reports shall be available for inspection at the EFW facility by the Regional Director (or one of the Ministry's employees authorized by him) during regular business hours. 3M shall provide the Regional Director with a copy of all reports referred to in c) above and shall consent to the release thereof by the Regional Director to the public. Notwithstanding anything contained in this paragraph, 3M shall not be required to maintain original entry records, daily records, monthly reports or summary reports for a period in excess of seven (7) years from the date of each such record or report.

Annual Report

14. Throughout the operational life of the EFW facility 3M shall conduct an annual performance review of the EFW facility operations to include:
- a) overall plant performance;
 - b) the adequacy of operation and maintenance standards;
 - c) complaints received and response to the same;
 - d) the output performance associated with the incineration of refuse;
 - e) housekeeping procedures of the facility;
 - f) analysis of emergencies and handling of same;
 - g) an estimate of waste component make-up, sources of wastes and estimated quantity by weight;
 - h) the quantities and description of all outgoing waste;

- i) details of downtime of the incinerator, together with related causes; and
- j) frequency, duration and cause of each baghouse system bypass.

The complete annual report shall be given to the Regional Director together with 3M's consent to the same being available for review by interested members of the public.

Interpretation

15. The paragraph headings have been added for convenience purposes only and the inclusion thereof shall not in any way affect the interpretation of the foregoing terms and conditions.

EXHIBITS

1. Affidavit of Marilyn Corrigan dated July 11, 1985 re notice
2. Affidavit of Alan G. Mills, August 1, 1985 re notice
3. Affidavit of Alan G. Mills dated October 14, 1985 re notice
4. Letter from R.M. McLeod, Q.C. dated October 11, 1985 re intervenor funding
5. Appendix A dated September 4, 1985 setting out terms of notice of Dr. E. Koczkur
6. Curriculum Vitae of Alan G. Mills and series of copies of overhead slides (22)
7. Map of City of London
8. Site Plan 3M
9. Plan of cross-sections
10. Draft Terms and Conditions prepared by 3M
11. Curriculum Vitae of William P. Torbet
12. Curriculum Vitae of William D. Goodings
13. Report prepared on behalf of 3M Canada Project
14. Curriculum Vitae of Joseph W. Kennedy
15. Curriculum Vitae of James H. Dempster
16. Series of copies of overheads (9)
17. Photocopy of Agreement (undated) 3M Canada and Her Majesty in Right of Canada
18. Memorandum October 14, 1985 from J.H. Dempster re information provided
19. Telex October 11, 1985 Carborundum Systems to Dempster
20. Memorandum October 14, 1985 J.H. Dempster re stack criteria
21. Resumes of A. Finkelstein and R.K. Klicius and photocopies of overhead slides (11)

EXHIBITS
(Continued)

22. Report - NITEP - two stage combustion (Prince Edward Island)
23. Letter October 7, 1985 - J.F. McDonald to John Martin
24. Table of Maximum Ground Level Concentrations NITEP
25. Dr. E. Koczkur Report October 10, 1985 Senes Consultants Limited
26. Curriculum Vitae Dr. Syndey C. Barton
27. Curriculum Vitae Dr. Colin J. Baynes
28. Photocopies of overhead slides (14)
29. Addendum Revised assessment ORF October 11, 1985
30. List of Standard ambient air quality criteria
31. Photocopy of Regulation 296
32. Table 17A Revised
33. Report October 15, 1985 by C.J. Baynes on Emergency Stack Emissions
34. Letter dated October 18, 1985 Dr. Baynes to Enercan re emissions from Emergency Stack
35. Memorandum October 16, 1985 from Kennedy to Baynes re Emergency Stack Emissions
36. Curriculum Vitae and witness statements from Paul Complin, Wilfred Ng and James Janse
37. Recommended terms and conditions
38. Curriculum Vitae Dr. Eugene Koczkur
39. Report October 21, 1985 Dr. Koczkur (Senes Consultants)
40. Revised Appendix 2 to Koczkur Report

CA20NEA 85E01

Ontario. Environmental Assessment Board.

EP-85-01

AN APPLICATION BY 3M CANADA INC. FOR A CERTIFI
APPROVAL FOR AN ENERGY FROM WASTE RECOVERY PLA

**RESOURCE CENTRE
INST. FOR ENVIRON'L. STUDIES
UNIVERSITY OF TORONTO**



